

ECS-Ecrea Early Career Scholar Prize winner - An astrological genealogy of artificial intelligence: From 'pseudo-sciences' of divination to sciences of prediction

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journals.sagepub.com/home/ecs**Leona Nikolić** 

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Abstract

Algorithmic media have adopted and adapted divinatory practices and vernaculars of prediction, prophecy, probability, fortune-telling and forecasting – suggesting a possible link between artificial intelligence and pre-scientific modes of speculation. Statistical thinking and magical thinking, too, can be recognised as closely correlated epistemological systems for governing societies and ways of life. In fact, primitive astrological practices of looking up at the stars may represent one of the earliest statistical projects involving sophisticated calculations and data sets. Such pattern-making techniques could even be considered precursory to machine learning. As a point of departure for exploring these eclectic relationships between stars and data, magic and machines, I use a media archaeological methodology to question the historical roles of both astrological and computational divination in mediating methods of control, surveillance and knowledge production across transforming societal contexts. This methodology is especially relevant for examining historical narratives in the field of cultural studies as it makes apparent the hyper-connectedness between objects, cultural representation and sites of hegemonic contention. My findings reveal relationships between celestial pattern recognition and efforts to exert control over and manipulate the natural environment and its populations, the historical impact of meteorological and climatological practices for predicting and influencing future events with artificial intelligence, and links between statistics and algorithmic data biases. This article suggests a speculative genealogy of astrology

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and artificial intelligence, as well as a genealogy of the theological, scientific and machinic unconscious.

Keywords

Artificial intelligence, astrology, celestial media, divination, speculation, statistics

Introduction: crabs in the sky

What do crabs and computers have in common? In ‘A Sea of Data: Pattern Recognition and Corporate Animism (Forked Version)’, German artist and theoretician Hito Steyerl (2018) suggests that the ways in which humans perceive patterns within randomness – seeing crab-shaped constellations in the starry night sky, for example – are not fundamentally dissimilar from the principles upon which artificial intelligence technologies function. ‘Are the patterns “recognized” in the sea of data today just superstitious mumbo-jumbo? Is apophenia an updated form of divination?’ (Steyerl, 2018: 14). Embedded amid broader musings on the hallucinatory nature of technology, our own predisposition to indulge in illusion and the mechanisms of perception in producing realities, Steyerl (2018) offers a glimpse into the role of ancient practices of celestial observation as precursory to the hyper-scientific technologies of artificial intelligence. Anecdotally recounting how magical thinking and pattern recognition of the starry night sky prompted the eventual restructuring of society through efforts to exert control over and manipulate the natural environment and its populations, Steyerl writes:

Back in the Neolithic, humans imagined star constellations and observed patterns of movement by projecting animal shapes into the skies. Let’s say they saw a crab and called this constellation Cancer. . . One could laugh about the poor naïve people of the period who insisted on seeing nonexistent shapes in the skies. But by tenaciously sticking to projecting fictional figures into the cosmos, the fundamental movements of the solar system were uncovered. . . The analysis of planetary and star movements enabled the development of the calendar and agriculture. Cue irrigation, storage, breeding, architecture, sedentary lifestyles, and so on. Storage created the idea of property. Bands of hunters and gatherers were replaced by proto-states of farmer-kings and slaveholders, by vertical social hierarchies. Apophenia – as a part of magical thinking – contributed to all these transformations (pp. 14–15).

To elaborate on Steyerl’s (2018) observation, I mobilise a theoretical framework that establishes historical and contemporary cultural denotations of both science (Bratton, 2015; Halpern, 2015; Reigeluth and Castelle, 2021; Turing, 1950) and magic (Campion, 2009; Morgan, 2013; Rutkin, 2019), as well as reflections on their intersections (Hörl, 2018; Josephson-Storm, 2018; Stengers, 2012; Stolor, 2016; Styers, 2004; Zielinski, 2006). I give particular attention to theorisations which draw lucid parallels between divinatory and algorithmic processes (Finn, 2017; Lazaro, 2018; Marenko, 2019; Natale, 2021; Pasquinelli, 2017) in order to propose an epistemological and historical continuity between astrology – a form of divination based on the positions and movements of celestial bodies – and artificial intelligence. In other words, I ask, how may the development of artificial intelligence be situated within an astrological lineage? What can ancient practices of astrology reveal about the historical development of artificial intelligence and its

current expressions? To propose an astrological genealogy of artificial intelligence, I conduct a media archaeological exploration (Chun, 2006; Kluitenberg, 2006; Natale, 2016; Parikka, 2012; Zielinski, 2006) in which I conceptualise the sky as media and examine the entangled histories of climatic media, statistical thinking and the sciences of prediction.

Pseudo or science?

Artificial intelligence and astrology may seem wholly irreconcilable with one another; while the former exemplifies the apex of scientific innovation and technology, the latter is a scientifically discredited belief system associated with magic, spirituality and the occult. However, they are remarkably congruent: both are resolutely concerned with making forecasts and producing meaning about the world through processes of pattern recognition. As a ‘new tool of prediction’ for ‘decision-making, risk assessment, and governance’ (Lazaro, 2018: 127), artificial intelligence has reinvigorated public belief in the knowability of the future and in modes of speculative thinking. Such algorithmic prediction, Christophe Lazaro (2018) argues, is akin to divination or magic. In fact, he asserts that ‘algorithms will take on the role of oracles in contemporary societies’. Prediction has consistently played an important role in human societies in both spiritual and political domains as a knowledge-making practice for mitigating uncertainty. Much like the divine celestial bodies that humans may call upon for matters of the future, artificial intelligence may more aptly be framed as a mode of ‘artificial divination’ (Lazaro, 2018: 128).

While it is traditionally the human brain of the astrologer that performs the divinatory mathematics of astrology, artificially intelligent machines execute their speculative calculations by attempting to simulate the human brain through computational means. This is achieved with the automated collection of mass volumes of data (Big Data) and their subsequent analysis through algorithmic processes characterised as deep learning (Reigeluth and Castelle, 2021). More specifically, deep learning methods are powered by neural networks – algorithmic systems structured to resemble the behaviour of neurons in the human brain (Halpern, 2015). In fact, it is this likeness to the human brain that is supposed to render such computational systems ‘intelligent’. This fascination with human brains and neurons in a computational context came out of the cybernetic desire to apprehend all systems (including those of the brain) as machines and, thus, to reimagine machine systems in the image of the brain.

As such, Alan Turing (1950), a foundational figure in the development of artificial intelligence, famously stipulated with his Turing Test that an artificially intelligent system must convince humans that it *is* human, not that it is *like* a human. However, over 70 years after Turing proposed his test, we do not so much expect artificial intelligence to imitate our own intelligence, but rather to surpass it exponentially – to be better, smarter and faster than us by processing more information than our human brains are capable of and to perceive what humans cannot (Bratton, 2015; Steyerl, 2018). A purported upgrade to human intelligence, artificial intelligence is employed as a ‘predictive tool for optimising decision-making processes, anticipating risks, and governing behaviour in a wide range of human activities’ (Lazaro, 2018: 127).

As a mode of speculation, astrology presents a striking similarity to artificial intelligence: through the observation and study of celestial patterns, it is used to both rationalise and

anticipate patterns of individual behaviour, societal events and natural phenomena (Campion, 2009; Rutkin, 2019). Thus, by examining the configuration of the sky at any given moment, astrologers are able to make ontological inferences. Furthermore, meticulous records of these configurations of the sky across time eventually permitted astrologers to make projections about future formations. Closely tied to astronomy, astrology differs from its still-scientifically-legitimate counterpart in its conviction that these celestial configurations determine the nature of reality on earth (Campion, 2009). Yet Darrel Rutkin notes that, historically, ‘Astrology was not some sort of magical nebulous hodgepodge of beliefs. . .[it] emerged in the thirteenth century as a richly mathematical system that served to integrate astronomy and natural philosophy’ (Rutkin, 2019: xviii). While the practice of astrology had once been institutionalised as legitimate knowledge at medieval and Renaissance universities from approximately the 13th to 17th centuries – studied alongside philosophy, mathematics and medicine, as well as theology, religion and magic – it suffered a gradual repudiation, relegated to the realm of unscientific mysticism (Rutkin, 2019).

This centuries-long shift occurred, in an Occidental context, across the development of science and the pursuit of secularisation of the overlapping Reformation and Scientific Revolution of 16th- and 17th-century Europe, the reason-based intellectualism of the 18th-century European Enlightenment and the ideals of technological and societal progress of 19th-century modernity in Western Europe and North America (Josephson-Storm, 2018; Rutkin, 2019). This ‘disenchantment’ of knowledge is often attributed to ‘the intertwining legacies of the Enlightenment, Marx, Nietzsche, Freud, and Weber [which] certainly encouraged social analysts to regard modernity as disenchanted, devoid of religion, God, and the transcendent’ (Morgan, 2013: 352). However, other scholars (e.g. Hörll, 2018; Josephson-Storm, 2017; Stollow, 2016; Zielinski, 2006) claim that this ‘disenchantment’ of Western society never actually occurred, arguing instead that religion, spirituality and magic continued to exert influence upon secularised pursuits of knowledge, scientific inquiry and technological development.

Such theorisations suggest that our intelligent machines may be more fantastical than real-thinking. Digital theorist Betti Marenko (2019) asks: ‘But what if the power to enchant never went away? What if magic never really disappeared but was actually incorporated within technological innovation?’ (p. 217). Here, Marenko (2019) theorises technology and magic as cognitively analogous, proposing not only that algorithms function as magical spellwork through which reality is configured but also that algorithmic media act as portals into new magical experiences of this reality. Magic represents the ability to allow us to, in David Abram’s words, ‘make tentative contact with the other sides of things that we do not sense directly, with the hidden or invisible aspects of the sensible’ (Stengers, 2012: 8). In fact, during the European Enlightenment, practices of magic were regarded by some as a form of scientific experimentation in which magic took on technological qualities; through the practice of magic, techniques were thus developed which enabled scientific pursuits to proliferate (Styers, 2004; Zielinski, 2006). While Zielinski (2006) suggests that magic is a precursor to science, Stengers (2012) proposes that science is a type of magic itself, as it is a metamorphic process of the assembly of knowledge.

Lazaro (2018), further suggests that algorithmic processes of machine learning and statistical modelling are premised on the same irrational beliefs of apprehending the future and of mitigating uncertainty as astrological practices are. In the same ways in

which astrology operates as a belief system about the nature of reality, so too does artificial intelligence require that we believe in it. Reiterating the principles of the Turing Test, Simone Natale (2021) insists that artificial intelligence is not actually *intelligent*, but that it is designed to be *perceived* as intelligent. In other words, it is intelligent because we believe that it is. And according to Natale (2021), fundamental to this belief are deception and obscurity. Deception informs belief by concealing the true nature of things with a specific vision of reality. In this way, artificial intelligence takes on the illusory quality of magic – a magic whose obscure operations may solely be deciphered by those with specialised knowledge.

In fact, obscurity is so embedded in the design of artificial intelligence algorithms through layers of coded languages that even the most advanced computer scientists, much less average users, cannot comprehend how they operate on a foundational level (Stolow, 2013). Matteo Pasquinelli (2017) accordingly refers to artificial intelligence as ‘An alchemic talisman whose functioning is rarely explained’ (para. 1). Similarly, for Ed Finn (2017), algorithms function as ‘pieces of quotidian magic’ that enact power by ‘[obscuring] and [highlighting]’ particular elements of human experience and reality (p. 16). Thus, they dictate what we can see and perceive and, therefore, what we can know. Astrology, like artificial intelligence, is situated at this nexus of belief, perception and the unknowable. Just as we cannot understand how algorithms generate patterns and make ‘intelligent’ decisions, we do not know, without esoteric astrological training, why the planets and stars and other celestial bodies supposedly influence our terrestrial domain. Whether by observation of the sky or through the processing of Big Data, both astrology and artificial intelligence can, thus, be conceived as divinatory belief systems that rely on complex data sets for making predictions and inferences.

Methodology

To further examine these connections, I engaged in a media archaeological methodological framework which involved a close reading of key theoretical and historical texts. This work largely relied on an analysis of secondary sources on socio-cultural traditions and practices regarding astrology, as well as on the reason and progress-based intellectualism of scientific developments and secularisation that contextualise the realisation of artificially intelligent systems. While this analytical approach is rooted in media archaeology, I deployed a speculative and philosophical methodology rather than an archival one.

By situating this theoretical analysis within a media archaeological methodology, I considered astrological divination and algorithmic prediction not as relics or as updated versions of one another, but rather as prognostic phenomena with intersecting histories that are concurrently anachronistic and parallel to one another. By rejecting a temporal discourse of progress, this historiographical pursuit is characterised by a heterogeneous strata of happening (Parikka, 2012) in which astrology and artificial intelligence are recognised as contextually and techno-culturally interdependent. Doing so necessarily blurs the boundaries between now and then, old and new (Natale, 2016; Zielinski, 2006), in an attempt to assemble cartographies of knowledge and power (Chun, 2006). Attention to the immaterial imaginary, (Kluitenberg, 2006) as that which governs knowledge in and through technology, too, is essential within this methodological framework.

A media archaeological approach is especially relevant for examining historical narratives in the field of cultural studies as it makes apparent the hyper-connectedness between objects, cultural representation and sites of hegemonic contention. Media archaeology, moreover, in its dynamic reimagining of the arena of hegemonic influence, requires a rejection of the positivist pursuits of ultimate truth, linear chronologies and dominant ideologies about the objects, beliefs and phenomena encountered in the world. To engage in media archaeology is to acknowledge a certain unknowability and an inherent incompleteness in attempts to understand pasts and presents. To neatly weave the strands of stories together would be not only impossible, but misleading as well. History, for lack of a better word, happens neither neatly nor coherently. To suggest that it does – that it happens in straight lines between clearly defined points – would do a disservice to humanity's experience with incongruent, yet entangled, experiences of reality.

To embark on this media archaeological excavation of the entanglements between astrology and artificial intelligence, I conducted an in-depth interpretation of Steyerl's (2018) quoted passage through the theoretical framework established in the previous section. The themes I discuss in this textual analysis prompted me to engage with the elementary thinking of John Durham Peters (2015) in which he conceptualises the sky as media. Subsequently, I explored ways in which the sky, atmosphere and elements have been studied and mediated by mobilising texts which offer critical perspectives and discourses regarding hegemonic relations and political implications on the matter. The selected texts permitted an investigation of Steyerl's (2018) claims concerning the restructuring of society and the manipulation of environments and their populations that were catalysed by methodical observations of the sky. With this media archaeological excavation, my objectives were 1) to locate both dominant and peripheral historical narratives about such claims and to identify their relations with astrology, divination and magic, as well as with techno-scientific infrastructures; and 2) to determine how the power relations and political struggles in which the development of artificial intelligence is embroiled are indebted to the legacies of antecedent predictive technologies.

Media archaeological historiography is inexhaustive research; archaeology, in any sense of the word, is perpetually doomed to be incomplete. Where does one begin and where does one end? How far does one go down the rabbit hole? My intention, thus, was not to present an exhaustive account, but rather to propose one that coherently articulates the complexities of the subject matter and that ultimately lays the groundwork for more comprehensive studies. For the purposes of this investigation, I limited my research materials to that which provided me with substantial information to bring together existing but fragmentary studies to propose an original perspective. Thus, this media archaeological work entails an assemblage of theoretical discussions on the analogies between astrology and artificial intelligence; histories of celestial, elemental and atmospheric media; and Steyerl's (2018) argument that apophenia has real-world socio-cultural and infrastructural impact. This assemblage is an indefinite attempt to challenge dominant ideological discourses on artificial intelligence by situating them within ostensibly obsolete cosmological paradigms.

Magical thinking: divination & apophenia

Steyerl's (2018) account of the human inclination to believe in relationships between unrelated things – here, between the 'crabs' in the sky and their earthly counterparts – refers to the psychological process of magical thinking. Magical thinking, as a way of believing, may be understood as an interface between the known and the unknown as a means by which to make sense of an otherwise inexplicable reality. In opposition to rational or logical thinking, magical thinking is based on causal inferences between discrete phenomena. It is, moreover, often predicated on the perceived similarity between things, providing a simple cognitive justification for a belief in their connectedness (Sternberg et al., 2007). It is conceivable, then, why ancient societies would have interpreted celestial configurations in the image of that which they were familiar with, thus causally linking the unknown with the known.

Yet, despite its presumed lack of scientific logic or reason, magical thinking as a method of description, decision-making and prediction is comparable to the statistical thinking of artificial intelligence. Referring to artificial intelligence, Steyerl (2018) asserts that 'The twenty-first-century augur creates the image before the event, anticipating its effect and calling forth reality' (p. 15). The author explains that artificial intelligence sees the 'definite' and imagines the 'probable' in the same way as humans may see real crabs and imagine them in the sky. Because artificial intelligence operates on a basis of approximation, classification and prediction, rather than of actual knowing, what is denoted as intelligence is not the ability to think or to learn, but rather to predict with approximate certainty through pattern-making and correlation (Finn, 2017; Lazaro, 2018; Pasquinelli and Joler, 2020). However, the algorithms on which AI operate are encoded with our desires and, thus, will ultimately fail because of the biases and limitations of our thinking that are incontrovertibly transposed onto the technology (Finn, 2017).

The failure of artificial intelligence, more than a mere technological glitch, can and has been catastrophic. As algorithmic pattern-making, approximation, classification and prediction function as techniques of surveillance and governance, visualising things into existence that do not exist is certainly problematic, especially in regard to colonial power structures. 'AI has indeed inaugurated the age of *statistical science fiction*'; in many cases, as Fabian Offert notes, 'instead of discovering things, we are inventing things' (Pasquinelli and Joler, 2020: 1270–1274). Marenko (2019) notes that by manifesting contingent realities, artificial intelligence algorithms effectively perform as 'technomagical' spell-casting machines. Based on massive and inherently biased data sets, artificial intelligence can predict where the next crime will occur, decide which kind of person should be approved for a mortgage and describe an individual according to their interests and behaviours (Chun, 2018; Schradle, 2020; Schüll, 2018; Thomas, 2021). What emerges is a 'statistical culture' (Pasquinelli and Joler, 2020: 1276) in which prediction and anticipation eclipse real futures.

As such, processes of pattern recognition, whether superstitiously causal or statistically induced, can contextualise parallels between the magical thinking of astrology and the statistical thinking of artificial intelligence. This magical thinking, as Steyerl

(2018) notes, takes the form of apophenia in the conjectural pattern-making practices of both divinatory methods and of artificial intelligence. Apophenia, pertaining to an inclination to see meaningful correlations between random things, is observable in artificially intelligent systems as ‘the perception of random patterns within random data’ (Steyerl, 2018: 14). The algorithmic neural networks on which artificial intelligence operates are trained to detect existing patterns in the data sets which they are fed in an attempt to render them capable of predicting future patterns that have not yet occurred, but that are *likely* or *probable* to occur. Such data sets have often shown to be biased in favour of white people and to contribute to the erasure or even criminalisation of people of colour. This is not only due to human biases in the development and deployment of these technologies, but also because there is *too much* data (Chun, 2018; Pasquinelli, 2017). Neural networks, despite their seemingly superhuman capacity to process and calculate information, can, consequently, over-learn, causing them to ‘paranoically spiral around embedded patterns rather than helping to reveal new correlations’ (Pasquinelli, 2017: para. 19).

Apophenic pattern recognition, whether divinatory or algorithmic, fundamentally alters humans’ ability to differentiate between what is *there* and what is *not there*, between the actual and the speculative. This existential confusion may be classified as ‘psychosis’ – the psychological condition in which time and space become unrecognisable to the extent that reality is replaced by pure delusion or hallucination (Halpern, 2014). In fact, Orit Halpern (2014) confirms that early iterations of artificial intelligence were deliberately conceived as ‘psychotic’ by their developers. For mid-20th-century cyberneticians Warren McCulloch, Walter Pitts and John von Neumann, psychotic neural nets liberated their visions of artificial intelligence from the constraints of historical temporalities – in a bid for their machines to simulate more organic pattern-making processes, the past and present would no longer hold any relevance for the future (Halpern, 2014). Here, we are reminded once again of Steyerl’s (2018) sky-crabs: ‘computer vision still seems to be in the phase where it thinks that there really are crabs in space and that the patterns emerging from the cosmos of data are actually reality’ (p. 15).

Sky as media

The sky is perhaps one of the most primordial and persisting forms of media, particularly in the context of forecasting and influencing future events. It is as much a backdrop for natural phenomena as it is for our beliefs, cosmologies and pursuits of knowledge. Until very recently, the sky remained untouched and unexplored by human civilisations (Peters, 2015). Yet even before we succeeded in our missions to take flight, launch objects into orbit, colonise airspace and tinker with the air’s chemical composition, the atmospheric and extra-atmospheric realms of the sky and outer space were a source of great wonder and existential influence. The sky is the heavenly space in which the deities of mythologies and religions reside, it is where the dead go when they die, from where life springs forth, and from where death and destruction cast their unsightly curses. It sustains life and it destroys life. Hence, it is to the heavens above that many people pray – for salvation, for guidance and for rain. Yet, it is an object of wonder and curiosity as much as it is an instrument for precision, calculation, order and control.

Peters (2015) observes that ‘The sky has resisted almost all human artifice and yet has always been at the heart of human knowledge. . . Many of our most important media are sky-born’ (p. 11, 165). The sky, as a medium itself – as media in the plural – seamlessly enmeshes matters of religion, culture and politics. In medieval Christian Europe, for example, ‘divine portents’ were believed to emanate from the heavens in the form of shooting stars or red-tinged skies (Daston, 1991). These interventions from god functioned as messages from a ‘higher’ being to ‘inferior’ ones, therefore conceptualising the sky as a mode of religious communication (Daston and Park, 1998). There is an explicit hierarchy here, too: an ‘astral [relationship] of domination and submission’ (Daston and Park, 1998: 163). As the primary interface between the natural and supernatural – between the mundane and the sacred – the sky continues to inspire fearful wonder, commanding authority through the religious agency bestowed upon it by believers.

Beyond its authority and status as religious media, the sky has also long been a vessel for secular truth and power. Ages before the so-called ‘disenchantment’ or secularisation of modern Western society, the ancient thinkers Pythagoras and, later, Plato envisioned the celestial sphere as governed by numerical principles of mathematics (Peters, 2015). The two theorised the sky not only as a means by which to measure observable phenomena but also as a means by which to measure time. As that elusive non-thing, the notion of time emerged from the sky and continues to be mediated through the sky. The sky, in this sense, functions as a compass, map, calendar, clock, newspaper and weather report, among other temporal media (Peters, 2015). Later, during European modernity and industrialisation, the practice of time-keeping as a secular method of systematisation gave rise to ideas about the rationalisation of time and of the science of statistics. Fundamentally concerned with determining uncertainties, probable events, variations and deviations regarding data sets, statistics (upon which the apophenic pattern-making neural nets of artificial intelligence are based) relies on the precision of time to make such predictions (Doane, 2002). Thus, we find the sky intertwined with statistical thinking as an apparatus of authoritative and speculative calculation.

Emerging as a persistent and dominant theme throughout various historical contexts is the relationship between celestial pattern recognition and the hegemonic distribution and exertion of power. Looking up at the sky led not only to astrological occultism, religious mysticism and secular rationalisation, but also precipitated the climatic sciences of astrometeorology, climatology and meteorology, as well as the sciences of probability and statistics upon which the former are contingent. As I will demonstrate, both secular and spiritual belief systems heavily influenced these scientific disciplines which continue to reinforce sky-mediated socio-political control and manipulation.

Astrometeorology

Studied alongside the medieval discipline of astrology was astronomy, which remains today a legitimate scientific study of celestial bodies and phenomena that is divorced from any notion of their causal relationship with terrestrial events. However, in medieval academic spheres, astrologers and astronomers were close collaborators. Notably, in medieval Islamic academia, the two worked together to introduce a form of theological weather divination known as astrometeorology (Lawrence-Mathers, 2021). In an

attempt to upgrade more classical approaches to meteorology which were largely based on hypotheses about the effects of meteors on the weather or on unanswered questions about seasonal patterns, astrometeorologists proposed that the movements of planets and the configurations of stars were responsible for earthly weather conditions (Lawrence-Mathers, 2021).

After the rapid integration of astrometeorology into the universities of medieval Europe, prominent astronomers Tycho Brahe and Johannes Kepler (who were also serious practitioners of astrology) further developed the discipline (Coen, 2020). According to Deborah Coen (2020), the meticulous research of these medieval astrometeorologists led to the production of some of the earliest weather records. For Brahe and Kepler, ‘the astrological principle of a resonance between microcosm and macrocosm validated attempts to apply knowledge of human-scale forces to theories of the cosmos’ (Coen, 2018: 33). Astrometeorological research persisted – albeit without its astrological framework – into the 19th century with British scientist James Croll’s astronomical theories about climate shifts, which, in turn, influenced further climatological studies regarding astronomical correlations by Croatian scientist Milutin Milanković in the 20th century (Coen, 2018). Ultimately, from these medieval sciences of astrology, astronomy and astrometeorology emerged the modern climate science of climatology in the 19th century (Coen, 2020).

Climatology

Distinct from meteorology in its concern for long-term predictions and its geographically vast scope, climatology, Coen (2020) claims, developed as an essential science for global imperial conquests and, consequently, for the territorial scaling of empires and the manufacture of territorial identity. By studying the climate, climatologists could determine ‘imperial plans to settle Europeans permanently’, ‘inform decisions about where to locate agricultural settlements and colonial towns’ and prepare ‘advice manual[s] for repurposing natural environments to fit the new economy’ (Coen, 2018: 8, 14). Climatological research was conducted primarily in Austria, Russia, India and the United States during this colonial period; later, in the 20th century, Japan, too, would establish itself as a climatological innovator (Coen, 2018; Furuhashi, 2022).

For the newly founded Austro-Hungarian Empire of the late 19th century, for example, statistical inferences about its various climate regions were used to make a nationalistic case to unite disparate territories based on a mutual dependency on one another to ensure greater survival and success (Coen, 2018). One of the empire’s principal climatologists, Julius von Hann, even helped to initiate a new literary genre of *climatography*, which would translate the numerical data of climatology from a ‘statistical abstraction’ into poetic nationalistic propaganda for readers (Coen, 2018: 145). As such, climates exterior to an empire came to be perceived as ‘bad’ – generally unfit for the white European constitution and conducive to producing uncivilised populations of ‘savages’ (Livingstone, 2002). In other instances, this racialised ‘moral climatology’ is responsible for therapeutic practices such as hydrotherapy, notably popularised by 19th- and 20th-century French colonisers to ‘cure’ themselves of the ills of African climates by bathing in spas with French water (Jennings, 2006). Along with climatology, the history of statistical research is plagued by racially biased data sets of intelligence quotient (IQ) testing

and the biometric determinism of phrenology and craniology which continue to influence artificially intelligent statistical speculation (Browne, 2015; Gould, 1981).

Based on principles of risk management, statistical thinking developed in the European context in 17th-century business forecasting, which relied on the collection of data through weather observation and population sampling to determine numerical averages about certain phenomena. As a result, the non-hereditary accumulation of wealth became possible from resource and labour exploitation, trade, insurance policies and investments (Bernstein, 1996). Later, statistics emerged in the 19th century as a model for future-making and as a barometer for truth which involved applying a ‘widely applicable set of procedures based on mathematical probability for studying mass phenomena’, notably serving as propaganda for the control of populations and individuals through eugenics and biometrics (Porter, 1986: 3).

Ideologies of moral climatology and the racialised statistical research of climates are not unique to Western empires. Early 20th-century Japan harboured imperial motivations of territorial expansion, as well (Furuhata, 2022). Japanese philosopher Watsuji Tetsurō’s writings maintained that ‘the modern conception of geopolitics is inseparable from climate determinism’ (Furuhata, 2022: 21). Such ideas fuelled the empire’s geopolitical quest to engineer liveable conditions in the extreme cold of some of their colonial territories, as well as artificial living structures for inhabiting the sea and the sky. Japan’s imperial climatology differed from Western versions in its conception of the state as a ‘living organism’, which prompted innovative experimental research for climate *control* (Furuhata, 2022). This climate control research, conducted at different times in competition and in collaboration with the United States, has present-day materialisations in personalised ‘smart’ climate systems that operate on networked surveillance systems of sensors for regulating individual ‘micro-climates’ (Furuhata, 2022).

Meteorology

The statistical, technological and engineering innovations of imperialistic climatological research contributed to advances in 20th-century meteorology – the science of weather. Weather, unlike the concept of climate which extends across the dimensions of time and space in order to describe regions and eras, is a quotidian and localised affair. The development of the seamless forecasting of future weather conditions based on daily records of present and past conditions required, according to Peters (2015), high-speed telecommunication media in addition to statistical methodologies:

It would be fruitless to publish local weather reports in eighteenth-century newsletters that took weeks to circulate. . . . Weather is so fickle that broadcasting it only makes sense when you have a quick and refreshable system of distribution that transcends local horizons. . . . There is no enterprise so data-hungry as meteorology (pp. 249–251).

Peters (2015) further asserts that weather forecasts – reliant on an intricate network of satellites, computers, cables, wireless frequencies, print media and screens – represent the original World Wide Web. James Bridle (2018) corroborates this notion, claiming that meteorology was the first form of computational thinking. He recounts the 1916 wartime calculations of mathematician Lewis Fry Richardson who succeeded

in numerically predicting weather conditions through elaborate mathematical formulas – ‘the first computerised daily forecast, without a computer’ (Bridle, 2018: 48). Although meteorological research can be traced back to ancient and medieval societies, as noted previously, it was the emergence of computational thinking, as well as of computational technologies later in the mid-20th century, that propelled the development of weather prediction.

Whereas climatology emerged in imperial contexts, meteorology as a weather science was developed – in tandem with computational machines – in the context of warfare as a military technology. Yuriko Furuhashi (2022) notes that strategies for the control and manipulation of the climate became techniques for the geopolitical domination of states, resources and populations through the more temperamental and short-term framework of weather conditions. Following Richardson’s early meteorological predictions from within the trenches of the First World War, in the United States computer scientist von Neumann, as well as his contemporaries Vladimir Zworykin and Vannevar Bush, began reimagining weather as an instrument of control for the Second World War (Bridle, 2018). Stimulated by the potential to realise nuclear weapons, meteorological research about atmospheric conditions simulated nuclear explosions and cloud control became a military priority (Peters, 2015).

The weather forecasting and the computational power developed during the Second World War led to the development of an early form of artificial intelligence at MIT in 1951: a real-time data gathering and processing digital computer, which was able to ‘simulate aerodynamic and atmospheric fluctuations’ and was ‘connected to and fed data by a range of sensors and offices, from radar systems to weather stations’ (Bridle, 2018: 70–71). Later, during the Cold War, concerted attempts by both Japan and the United States to control snow, ice, fog, clouds and rain produced further progress for networked computing through the development of data communication and processing systems (Furuhashi, 2022). Bridle (2018) certainly makes a potent observation, contending that ‘All contemporary computation stems from this nexus: military attempts to predict and control the weather, and thus to control the future’ (p. 71).

Artificial divination

As ‘an established method for acquiring information, which was deeply rooted within the institutions of faith, knowledge, and power’ (Ludwig, 2019: 102), divination provided foundations for the analytical and observational methods of mathematics and the natural sciences. Numbers and data arranged in the form of graphs, tables and charts took on the magical role of astrological diagrams as spectacular displays of knowledge and truth. David Benqué (2021) argues that such diagrams legitimised ‘jumping to conclusions’ (p. 492), a practice of future-making rooted in the decoding of uncertainty and unknowability that is not unlike divination. Used to measure variation against a backdrop of uncertainty, numbers and data came to function as a scrying mirror for determining general truths about reality, just as the stars in the sky long had (Porter, 1986). Despite certain conceptions of statistical thinking as an epistemological severance with the magical thinking of divination, a connecting thread persists in the interpretive principles of analytical reasoning that both require for generating predictions.

Why, then, have algorithmic systems of probabilistic prediction which rely on statistical calculations been unreservedly accepted and welcomed by scientific institutions? Why is artificial intelligence not considered yet another pseudo-scientific instrument as astrologers' divinatory charts are? Has divination indeed re-emerged as a legitimate form of knowledge-making? Perhaps, as Lazaro (2018) surmises, artificial intelligence has destabilised the empirical foundations of science. So long as the predictions 'work', no explanation is necessitated for algorithmic predictions. Thus, if divination is the irrational knowledge-making version of scientific rationality, are algorithms irrational?

Benqué (2021) is careful not to delegitimise both artificial intelligence and astrology as irrational simply because of their correlations with one another. To do so would not only be ignorant of their intertwined cultural legacies, but dismissive of their socio-technical roles as deceitful mechanisms. Natale (2021) expands on this notion, explaining that our technologies are meaningful to us only insofar as we allow ourselves to be deceived by them. In other words, it is our human nature to co-create illusions of certainty, truth and knowledge with our technologies, whether they be ancient divinatory practices or artificially intelligent algorithmic systems. What is at stake here is not so much the question of scientific legitimacy and the legitimacy of science, but the power that speculative practices of future-making hold over human agency and the experience of reality.

Conclusion

The ambitious hypothesis that astrology and artificial intelligence are not contradictory systems of knowing the world, but rather are closely related as epistemological frameworks, exposes the tightly woven histories between magical divination and the probabilistic mathematics of statistics, between stars and data and between the sky as media and the sky as battlefield. That prehistoric humans may have unpretentiously gazed up at a glittering night sky, only to land us on the verge of a reality in which the singularity of artificially intelligent ascendance over humankind is no longer a science fiction, appears as quite a loose causal conjecture. Is my hypothesis nothing more than a bad case of apophenia? Am I perceiving patterns between astrology and artificial intelligence where there are none? Yet, the vast entanglement of the two that I present would suggest otherwise.

Astrology, emerging from ancient folk traditions of pattern recognition as an institutionalised system of divination in medieval academia, laid the foundations for astronomy and astrometeorology. Despite the purported disenchantments of science and modernity, the magic associated with astrology was transposed onto our media technologies and computational machines. Humankind never ceased to look at the sky. In fact, the sky continues to elicit wonder and to exert its authority over humans as natural beings, even in our efforts to dominate it. Through imperial and military exploits, the language of the sky has been translated into the climatic sciences of climatology and meteorology. Both the study of the climate and of the weather necessitated comprehensive data, statistical calculations and the capacity for powerful computing. Artificial intelligence materialised from the algorithms and neural networks of these computers, modelled in the image of the rationally psychotic human brain.

Such narratives reveal the underlying instability of knowledge itself – and subsequently, that of truth and reality. What do we consider science? What do we consider intelligent? And what happens when we grant divinatory powers to our machines? For all this development, for all this data, the machine has yet to surpass the intelligence of the mind and its speculations remain fundamentally undifferentiated from divination. What has changed, however, is how we believe and what we believe in. Our supernatural fixation on magic as the mediator between experience and reality shifted to a preoccupation with the mind as the locus of objective scientific reasoning, which in turn was superseded by the imaginary of algorithmic cognition. This research thus presents not only a speculative genealogy of astrology and artificial intelligence, but also a genealogy of the theological, scientific and machinic unconscious.

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Biographical note

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